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PATENTKANTOOR  
REPUBLIC OF SOUTH AFRICA



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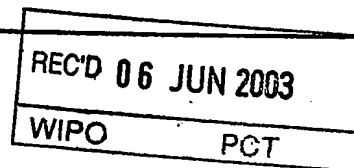
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Certificate  
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DEPARTMENT OF TRADE  
AND INDUSTRY

Hiermee word gesertifiseer dat  
This is to certify that



the documents annexed hereto are true copies of:

Application forms P.1 and P.2, provisional specification and drawings  
of South African Patent Application No. 2002/1450, as originally  
filed in the Republic of South Africa on 20 February 2002, in the name  
of RCM PLASTICS CC for an invention entitled : " A SCREENING  
ELEMENT AND FRAME THEREFOR".

**PRIORITY DOCUMENT**  
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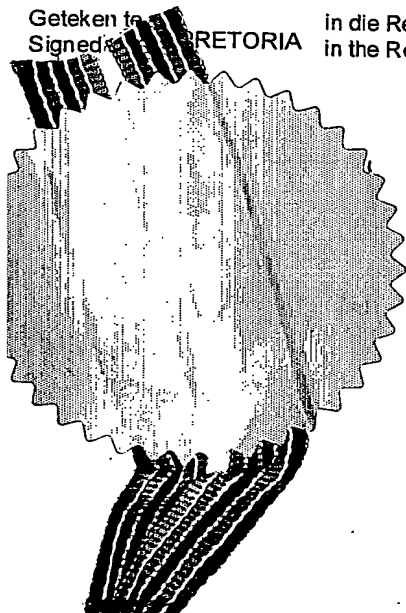
PRETORIA


in die Republiek van Suid-Afrika, hierdie  
in the Republic of South Africa, this

15th

dag van  
day of

April 2003



  
Registrateur van Patente  
Registrar of Patents

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

## REGISTRAR OF PATENTS

Official Application No.			Lodging date: Provisional		Acceptance date:	
21	01	20021450	22	22/02/2002	47	
International classification			Lodging date: Complete		Granted date:	
51			23			
Full name(s) of applicant(s)/Patentee(s)						
71	RCM PLASTICS CC					
Applicant(s) substituted:					Date Registered:	
71						
Assignee(s):					Date Registered:	
71						
Full name(s) of inventor(s)						
72	MAHL, Franz; LOUW, Charl, Wynand; REID-ROBERTSON, Johan, Theodore; MARIETTA, Angelo					
Priority claimed		Country		Number		Date
Note:  Use International Abbreviation for Country	33	NONE	31	NONE	32	NONE
	33		31		32	
	33		31		32	
Title of Invention:						
54	A SCREENING ELEMENT AND A FRAME THEREFOR					
Address of applicant(s)/patentee(s)						
CNR MAIN & DAM ROAD, ANDERBOLT, BOKSBURG, SOUTH AFRICA						
Address for Service:						
74	McCALLUM, RADEMEYER & FREIMOND, Maclyn House, June Avenue, Bordeaux, Randburg P.O. Box 1130, Randburg 2125					
Patent of Addition No.			Date of any change:			
61						
Fresh Application based on:			Date of any change:			

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PATENTS ACT, 1978

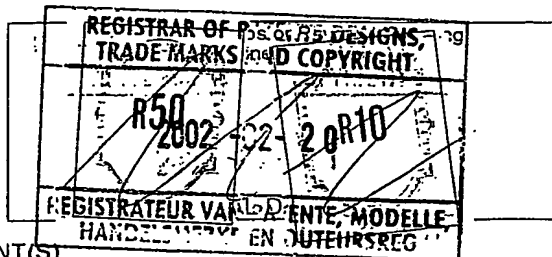
APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT

(Section 30(1) – Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION NO.

21	01	20021450
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FULL NAME(S) OF APPLICANT(S)

71	RCM PLASTICS CC
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ADDRESS(ES) OF APPLICANT(S)

CNR MAIN & DAM ROAD, ANDERBOLT, BOKSBURG, SOUTH AFRICA
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TITLE OF INVENTION

54	A SCREENING ELEMENT AND A FRAME THEREFOR
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Priority is claimed as set out on the accompanying Form P2.

The earliest priority claimed is: NONE

This application is a patent of addition to Patent Application No.	21	01
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This application is a fresh application in terms of section 37 and based on Application No.	21	01
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THIS APPLICATION IS ACCOMPANIED BY:

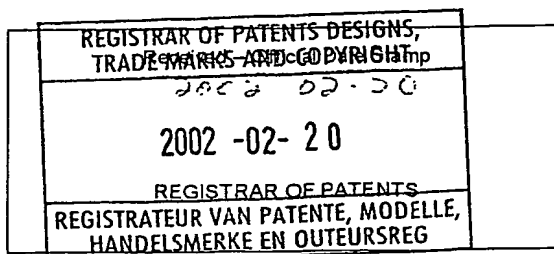
- ☒ 1 A single copy of a provisional specification of ... 12... pages
- ☐ 2 Two copies of a complete specification of ..... pages
- ☒ 3 ...3... Sheets of Informal Drawings
- ☐ 4 ..... Sheets of Formal Drawings
- ☐ 5 Publication particulars and abstract (Form P8 in duplicate)
- ☐ 6 A copy of Figure ..... of drawings (if any) for the abstract
- ☐ 7 Assignment of Invention
- ☐ 8 Certified priority document(s) Number(s)
- ☐ 9 Translation of priority document(s)
- ☐ 10 An assignment of priority rights
- ☐ 11 A copy of the Form P2 and the specification of SA Patent Application
- ☐ 12 A declaration and power of attorney on Form P3
- ☐ 13 Request for ante-dating on Form P4
- ☐ 14 Request for classification on Form P9
- ☒ 15 Form P2 in duplicate

21	01
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74	ADDRESS FOR SERVICE: McCALLUM, RADEMEYER & FREIMOND, Maclyn House, June Avenue, Bordeaux P.O. Box 1130, Randburg, 2125
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Dated this 20th day of FEBRUARY 2002

McCALLUM, RADEMEYER & FREIMOND  
PATENT AGENTS FOR APPLICANT(S)



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**PROVISIONAL SPECIFICATION**

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO			LODGING DATE	
21	01	20021450	22	20 FEBRUARY 2002

FULL NAME(S) OF APPLICANT(S)	
71	RCM PLASTICS CC

FULL NAME(S) OF INVENTOR(S)	
72	MAHL, Franz; LOUW, Charl, Wynand; REID-ROBERTSON, Johan, Theodore; MARIETTA, Angelo

TITLE OF INVENTION	
54	A SCREENING ELEMENT AND A FRAME THEREFOR

## 5 BACKGROUND OF THE INVENTION

This invention relates to a screening element and a frame therefor used for the screening of any particulate material.

It is known to form a screen from a plastics material. In order to provide strength to the plastics screen a metal frame is trapped within the plastics material. The metal frame is normally of mild steel and is formed from flat bar which is cut, bent and welded to form a frame of the required size and shape.

The manufacture of the metal frame is a laborious, labour intensive and multistep process. A large and robust frame adds significant weight to the screen.

During the manufacturing of the screen separate spaces are placed on the metal frame whereafter the plastics material is cast or injection moulded around the metal frame. In this manner the metal frame is trapped inside the plastics material.

As a result of the characteristics of the plastics material and the metal frame no direct bonding occurs between the plastics material and the metal frame. Heat from the plastics material, during the casting or injection moulding process, is transferred to the metal frame and if the size and width of the metal frame are not within specific parameters, warpage, bending and distortion of the metal frame occur as a result of the heat. In practice it has been found that a metal frame having a width of at least 8mm and a height of 12mm successfully withstands the heat from the plastics material. The minimum width of the metal frame results in broad sections of the screen having to be reserved for the metal frame which results in a loss of screening area.

The metal frame is further susceptible to oxidation in harsh environments.

5 During use of the screen, wear of the plastics material results in the eventual exposure of the metal frame. Once the metal frame is exposed the plastics material is easily dislodged from the metal frame which results in the catastrophic failure of the screen.

During the recovery of a used screen it is also difficult and costly to recover the metal of the frame for re-use in subsequent metal frames.

10 It has further been found that when the screen is subjected to impact the metal frame often bends and distorts the screen. This could affect the productivity of the screen.

A further problem associated with all screens is the fact that if the screen is dislodged from a fixed structure supporting it the failure of the screen often goes unnoticed which results in defective screening taking place. If the dislodged screen is transported away  
15 from the screening area substantial production time could be wasted in the recovery of the screen and the re-screening of the affected material.

#### SUMMARY OF THE INVENTION

The invention aims to provide a screening element and a frame for a screening element which could be used as an alternative to the respective aforesaid screens with metal  
20 frames, and the metal frames.

The invention provides a frame for a screening element which includes a frame body of a first plastics material and a plurality of keying formation on the frame body.

The frame body is preferably rectangular in outline and defines at least one rectangular opening with a plurality of inner corners. At least one of the inner corners may be  
25 curved or alternatively at least one of the inner corners may be slotted to provide an expansion point.

5 The frame body may include at least one cross member.

The first plastics material may be a material sold in the trade under the trade name DURATHANE BKV30.

The keying formations may be of any appropriate shape or size and are preferably in the form of grooves, spigots or apertures.

10 A plurality of spacers may be integrally formed with the frame body.

In cross section the frame body may have a slenderness ratio of at least 2:4 and preferably the slenderness ratio is 2:5.

The invention further provides a screening element which includes a screen body of a second plastics material and a frame body from a first plastics material which is at least  
15 partially embedded in the screen body.

The screen body may include a plurality of apertures and a plurality of location  
● formations.

Preferably the second plastics material is polyurethane.

The frame body may include a plurality of keying formation which are of any appropriate  
20 size and shape and preferably are in the form of grooves, spigots or apertures.

The frame body is preferably rectangular in outline and defines at least one rectangular opening with a plurality of inner corners. At least one inner corner may be curved or alternatively slotted to provide an expansion point.

The frame body may include at least one cross member.

5 A plurality of spacers may be integrally formed with the frame body.

The frame body may have a slenderness ratio of at least 2:4 and preferably the slenderness ratio is 2:5.

The first plastics material preferably has a greater density than the second plastics material and may be of a type which is sold under the trade name DURATHANE

10 BKV30.

The invention also extends to a method of manufacturing a frame for a screening element which includes the step of forming a frame body from a first plastics material.

The frame body may be formed in an injection moulding step.

Preferably the first plastics material is of a type which is sold under the trade name

5 DURATHANE BKV30.

The method may include the step of forming a plurality of keying formations in the frame body. The keying formations may be of any appropriate size and shape and preferably are in the form of grooves, spigots or apertures.

0 The method may include the step of integrally forming a plurality of spacers on the frame body.

Preferably the frame body is rectangular in outline and defines at least one rectangular aperture with a plurality of inner corners.

The method may include the step of forming a slot in at least one of the inner corners.



5 The invention further extends to a process for the manufacturing of a screening element which includes the steps of:

- (a) forming a frame from a first plastics material; and
- (b) moulding a screen body from a second plastics material at least partially around the frame.

10 The frame is preferably formed in a first injection moulding step and the screen body is preferably moulded in a second injection moulding step.

The first plastics material preferably has a greater density than the second plastics material and may be of a type which is sold under the trade name DURATHANE BKV30. The second plastics material is preferably polyurethane.

15 The frame may be of the aforesaid kind.

The process may include the step of placing the frame in a dieset wherein the screening body is injection moulded.

The invention also provides a screening element which includes a screen body from a second plastics material, a cavity in the screen body and a tag located in the cavity.

20 The term "tag" is used in this specification in relation to any electronic, metal or other device of which the presence or lack of presence can be detected by a sensor, such as for example an electronic signature device, a transponder or an isotope.

The cavity may be plugged.

The tag is preferably in the form of an electronic device.

- 5 The invention further extends to a screening system which involves a screening element of the aforesaid kind and a sensor for monitoring the presence or lack of presence of the tag.

The sensor may provide an output to an alarm.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 The invention is further described by way of examples with reference to the accompanying drawings in which:

Figure 1 is a plan view of a screening element according to the invention;

Figure 2 is a sectioned side view on the line 2-2 of the screening element of Figure 1;

15 Figure 3 is a plan view of a frame according to the invention used in the screening element of Figure 1; and

Figure 4 is a side view of the frame of Figure 3; and

Figure 5 is a diagrammatical representation of a screening system according to another aspect of the invention.

#### DESCRIPTION OF PREFERRED EMBODIMENT

- 20 The accompanying Figures 1 and 2 show a screening element or screen 10 which has a screen body 12 and a frame 14 at least partially enveloped by the screen body 12. The screen body 12 is rectangular in outline and has a border 16 which surrounds a plurality of screening apertures 18. A number of location formations 20 are formed in

5 the border 16. The apertures 18 and location formations 20 are of known construction and are not further described.

The screen 10 also has a support section 22 which extends across the screen body 12.

The frame 14 has a rectangular frame body 24 with a cross member 26 which extends across the frame body 24 to define two rectangular openings in the frame body 24. The  
10 frame body 24 and the cross member 26 are respectively located within the border 16 and the support section 22.

The frame body 24 is from a first plastics material which is sold under the trade name DURATHANE BKV30 and the screen body 12 is from a second plastics material which is polyurethane. The first plastics material has a greater density than the second plastics  
15 material which makes it more robust and resistant against deformation and bending than the second plastics material.

As is shown in Figures 3 and 4 the frame body 24 defines a plurality of inner corners  
28A, B, C and D. Each of these inner corners 28A, B, C and D has a slot 30 formed in the frame body 24.

20 A plurality of keying formations 32 are integrally formed with the frame body 24. The size and shape of the keying formations 32 depend on the application of the frame 14 and in this example are in the form of grooves 34, spigots 36 and apertures 38.

A plurality of spacers 40 are also integrally formed with the frame body 24.

The frame 14 is manufactured in a first injection moulding process during which the  
25 slots 30, the keying formations 32 and the spacers 40 are all integrally formed in and on the frame body 24.

5 The frame 14 is thereafter placed in a dieset 41 (shown in dotted outlines in Figure 3) in such a manner that the spacers 40 which are on the sides and bottom of the frame 14 abut the sides and floor of the dieset 41. The screen body 12 is thereafter injection moulded alternatively cast around the frame 14 so that the frame 14 is embedded within the screen body 12.

10 After the screen 10 is removed from the dieset a cavity 50 (see Figure 1) is formed in the screening body 12 wherein a electronic tag 52 is placed. The cavity 50 is plugged so that the electronic tag 52 is trapped within the screen body 12.

The electronic tag 52 is of known construction and is not further described.

In use the screen 10 is attached to a fixed structure (not shown) making use of the location formation 20 whereafter the screen 10 is used for the screening of particulate material (not shown) in a known manner.

As the screen body 12 wears down as a result of the abrasive forces of the particulate material acting on the screen 10 the frame 14 is eventually exposed. The keying formations 32 prevent the screen body 12 from disengaging from the frame 14. In particular the grooves 34 and the apertures 38 allow for the second plastics material of the screening body 12 to bridge the frame 14. In this way the working life of the screen 10 is extended and the screen 10 can be used for an extended period although the frame 14 is exposed.

As the frame 14 is of a plastics material abrasion of the frame 14 is less than is the case with a frame from mild steel.

- 5 The frame 14 is further flexible and does not bend permanently as is the case with the prior art metal frames. The screen 10 is therefore capable of substantial shock absorption.

The integrally formed spacers 40 further negate the need for separate spacers in order to locate the frame 14 in the dieset 41.

- 10 As is shown in Figures 3 and 4 the sides of the frame 14 have a width W which is 6mm and a height H which is 15mm. The frame 14 thus has a slenderness ratio of 3:5. The Applicant has found that the slenderness ratio of the frame 14 could even be in the order of 2:4 and still resist warpage and deformation as a result of heat from the second plastics material.

- 15 This greater slenderness ratio of the frame 14 allows for the reduction of a width W' of the border 16 and the support section 22 compared with prior art screening elements. This reduction in width W' in turn allows for more screening area wherein screening apertures 18 can be formed.

The plastics frame 14 is less susceptible to oxidation than the prior art metal frames.

- 20 Each slot 30 forms a heat expansion point and protects the frame 14 from warpage when the frame 14 is exposed to heat from the second plastics material.

The steps involved in the manufacture of the frame 14 are less than with the prior art metal frames as there is no need for cutting, bending and welding of the frame sections.

- The frame 14 is also lighter than the prior art metal frames which improves the handling  
25 of the screen 10. The injection moulding of the frame 14 further allows for frames 14 of various shapes and sizes to be manufactured with relative ease.

5 A further advantage of the plastics frame 14 is in the recovery of used screens 10. The first plastics material of the frame 14 is recovered for the manufacture of a new frame 14 and the remainder of the second plastics material of the screen body 12 is recovered for the molding of a new screen body 12. In this manner the whole used screen 10 is recovered and material wastage is reduced to a minimum.

10 The reduction in manufacturing steps, the increased working life, effectiveness and the recoverability of the screen 10 have obvious cost benefits.

It is to be understood that the frame 14 can be made in various shapes and sizes with any number of cross members 26 depending on the application of the screen 10.

In addition to the mechanical lock provided by the keying formations chemical binding  
15 agents are used if required to form a bond between the frame 14 and the screen body 12. This chemical bond further extends the working life of the screen 10.

In use when the screen 10 is dislodged from the fixed structure the screen 10 is often  
20 caught on the conveyance for the screened particulate material and the further screening of the particulate material is compromised. A sensor 54 (see Figure 5) is placed on the downstream side of the fixed structure to locate any electronic tags 52 which should pass its location. As the dislodged screen 10 passes the sensor 54 the presence of the electronic tag 52 is detected, an alarm 56 is raised and the flow of the particulate material is stopped. This allows manual inspection, removal and repair of the dislodged screen 10 with the minimum disruption to the screening process and

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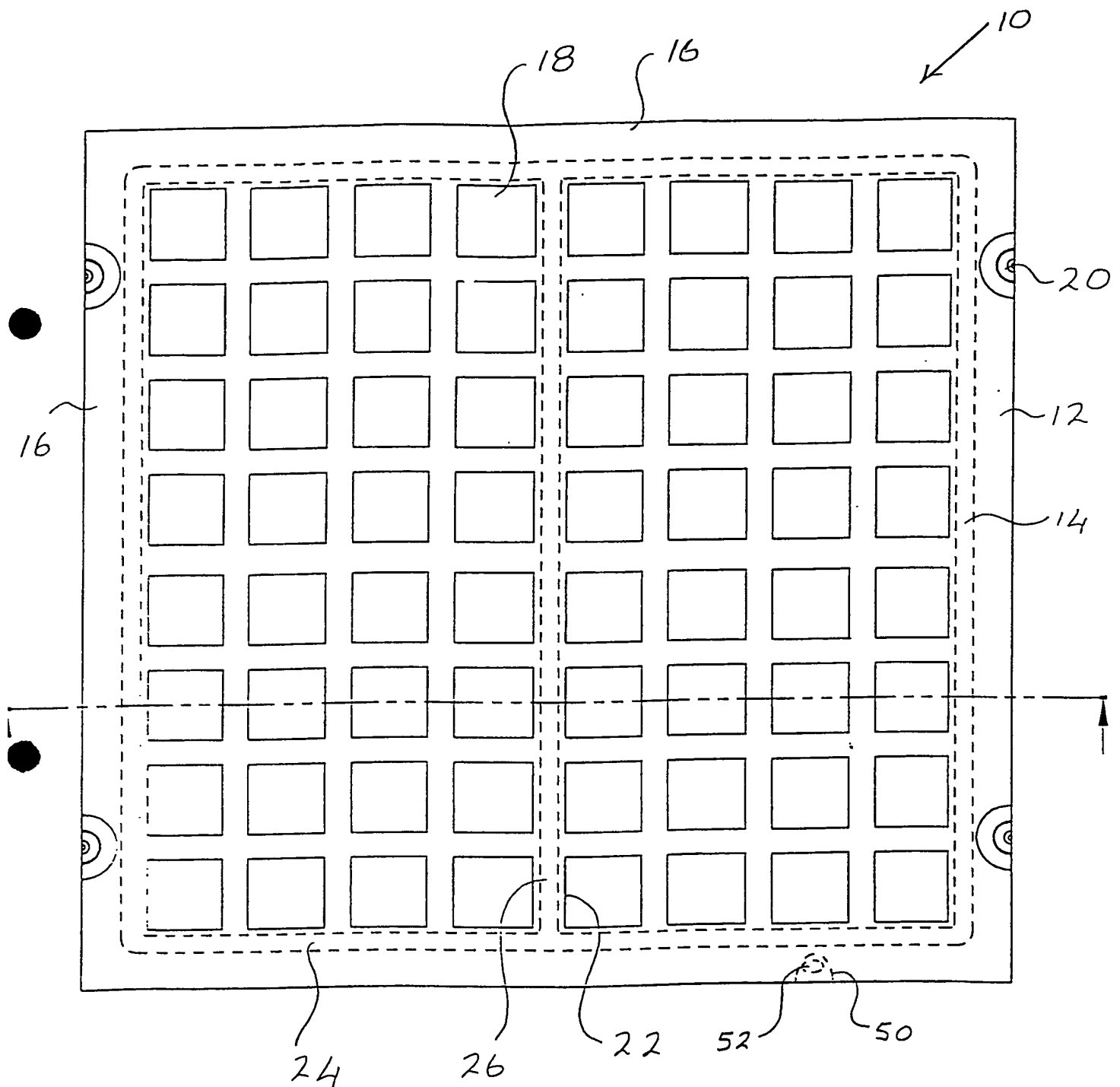
5 minimum wastage of screening time.

Dated at RANDBURG on this 20<sup>th</sup> day of FEBRUARY 2002.



McCallum Rademeyer & Freimond

10 Patent Agents for the Applicant (s)

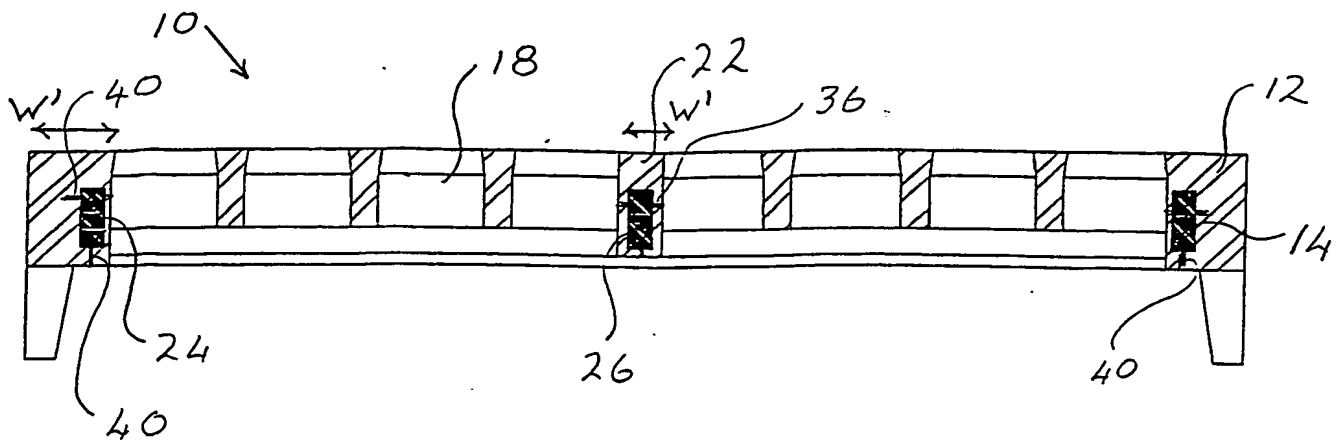


**FIGURE 1**

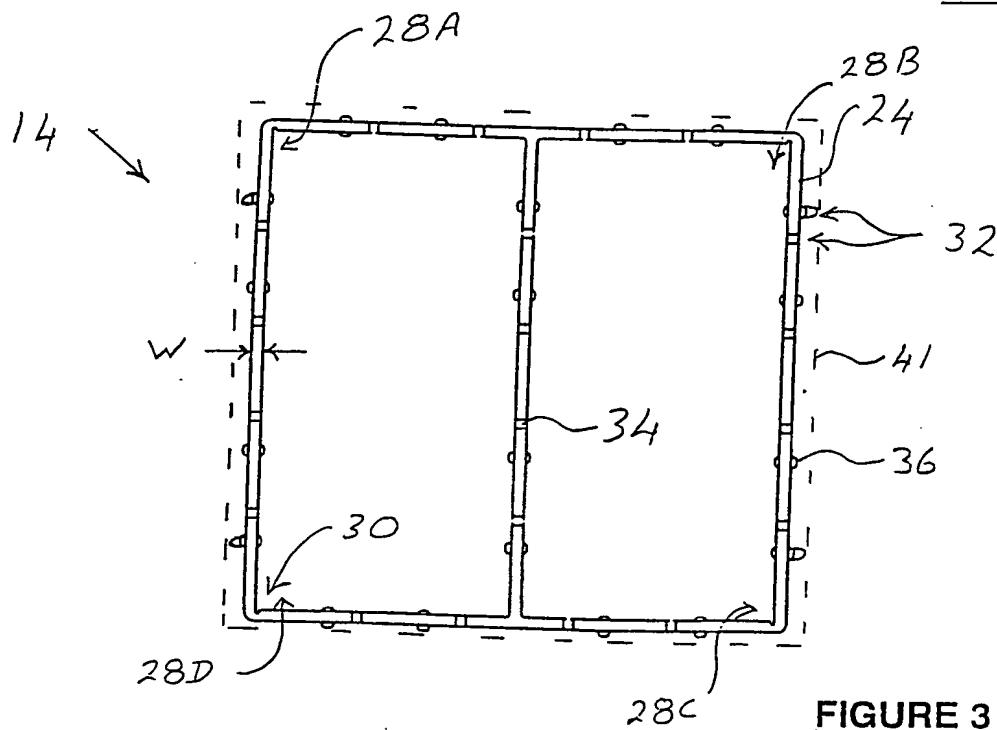
McCallum Rademeyer & Freimond  
Patent Agents for the Applicant(s)

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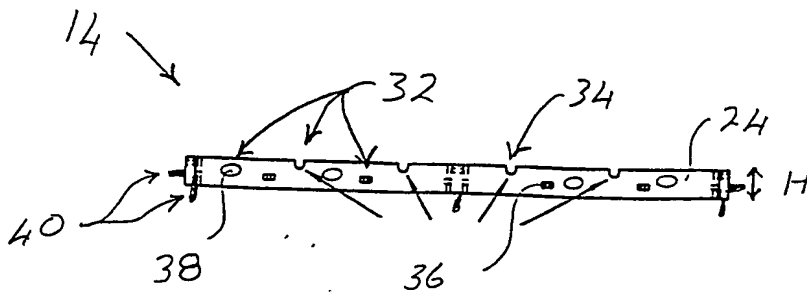




**FIGURE 2**

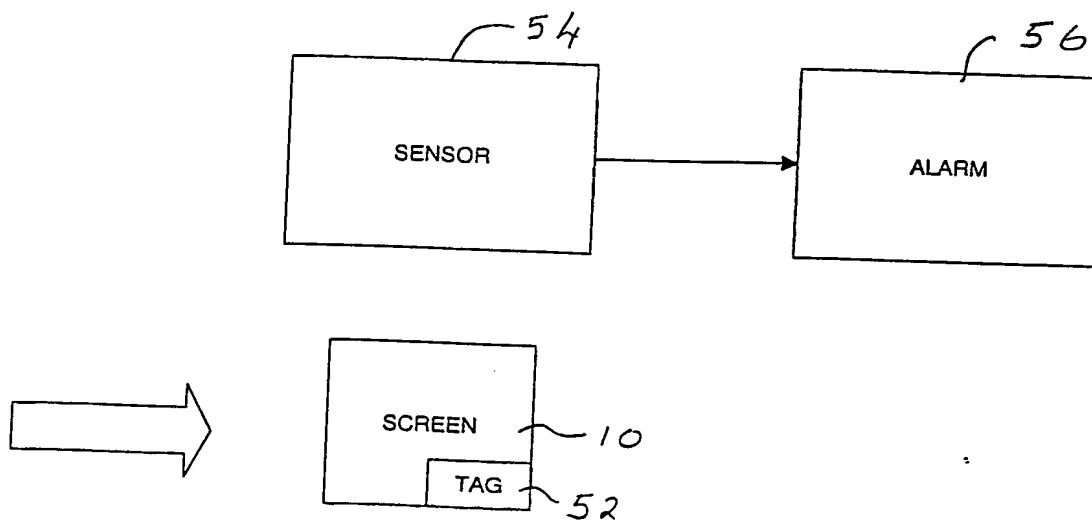


**FIGURE 3**



**FIGURE 4**

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**FIGURE 5**

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